WHAT IS CLAIMED IS:

1. A method for treating existing and/or potential presbyopia of a patient, the patient having an eye with a pupil, a change in viewing distance with the eye inducing a change in pupil dimension, the method comprising:

measuring a first dimension of the pupil at a first viewing distance;

determining a first desired power for the eye at the first viewing distance;

determining a prescription for the eye such that the prescription provides the first desired power when the pupil has the first dimension, and such that the prescription effects a desired change in power in response to the change in pupil dimension, the desired change in power mitigating the presbyopia.

2. The method of claim 1, wherein a rate of the desired change in power for the change in pupil dimension comprises from about 0.25 D/mm to about 5.0 D/mm.

3. The method of claim 2, wherein the patient is about 45 years old or less, and the rate comprises from about 0.25 D/mm to about 1.0 D/mm.

4. The method of claim 2, wherein the patient is about 60 years old or more, and the rate comprises from about 1.0 D/mm to about 5.0 D/mm.

5. The method of claim 1, further comprising determining a second desired optical power for the eye at a second viewing distance.

6. The method of claim 5, further comprising determining at least a third desired optical power for the eye, each optical power having an associated viewing condition, a rate of an incremental desired change in power for an incremental change in pupil size varying within a pupil size range of the patient.

7. The method of claim 5, further comprising measuring the change in pupil dimension of the patient by measuring a second pupil dimension of the pupil at the second viewing distance.

8. The method of claim 1, wherein a rate of the desired change in optical power for the change in pupil dimension is assumed consistent for a plurality of patients.

9. The method of claim 1, wherein the eye has a residual accommodation range, and wherein the first desired power for the eye is determined so that the eye adjusts within the residual accommodation range when viewing at the first viewing distance with the first desired optical power.

10. The method of claim 1, wherein the patient is about 60 years old or less, and further comprising adjusting at least one of the first desired power for the eye and the desired change in power in response to at least one of an anticipated shrinkage of the pupil and anticipated reduction of residual accommodation.

11. The method of claim 1, wherein the prescription is determined at least in part by iteratively optimizing a goal function.

12. The method of claim 1, wherein the prescription is determined at least in part by scaling a refractive shape.

13. The method of claim 1, wherein the prescription is determined at least in part by deriving an optical shape providing a plurality of desired optical powers at an associated plurality of viewing conditions.

14. A system for treating existing and/or potential presbyopia a patient, the patient having an eye with a pupil, a change in viewing distance with the eye inducing a change in pupil dimension, the system comprising:

a device for measuring a first dimension of the pupil while the eye is viewing at a first viewing distance;

a prescription generating module having an input accepting a desired power for the eye and the first dimension, the module determining a prescription for the eye providing a first desired power when the pupil has the first dimension, the prescription effecting a desired change in power in response to the change in pupil dimension, the desired change in power mitigating the presbyopia.

15. The system of claim 14, wherein the pupil measurement device comprises a pupilometer, and wherein the prescription generating module comprises at least one member selected from the group consisting of:

an optimizer module that determines the prescription based on the pupil diameter and the desired power using a goal function appropriate for the presbyopia;

a scaling module that scales a central portion of a prescription shape based on the pupil dimension such that the prescription shape ameliorates presbyopia, and such that the central portion has a dimension between about 0.35 and about 0.55 of the pupil dimension; and

a prescription calculating module, the module calculating a presbyopia-mitigating prescription for the eye in response to the pupil dimension and the change in pupil dimension so that the eye has the first desired power suitable for the first viewing distance and so that the eye has a second desired power for a second viewing distance.

16. A method for determining a prescription that mitigates or treats presbyopia in a particular patient, the method comprising:

(a) selecting a goal function appropriate for presbyopia of an eye;

(b) inputting a set of patient parameters specific for the particular patient; and

(c) determining an optical shape for the particular patient appropriate for differing viewing conditions based on the set of patient parameters per the goal function so as to mitigate or treat the presbyopia in the patient.

17. The method of claim 16, wherein the goal function reflects optical quality throughout a vergence range.

18. The method of claim 16, wherein the goal function comprises a ratio of an optical parameter of the eye with a diffraction theory parameter.

19. The method of claim 18, wherein the goal function comprises at least one parameter selected from the group consisting of Strehl Ratio (SR), modulation transfer function (MTF), point spread function (PSF), encircled energy (EE), MTF volume or volume under MTF surface (MTFV), compound modulation transfer function (CMTF), and contrast sensitivity (CS).

20. The method of claim 19, wherein the optical shape is determined such that it has a value of about 25% CMTF over a vergence.

21. The method of claim 16, wherein the goal function is based on geometrical optics.

22. The method of claim 21, wherein the goal function is determined using ray tracing.

23. The method of claim 16, wherein the set of patient parameters comprises at least one parameter selected from the group consisting of pupil size, residual accommodation, and desired power.

24. The method of claim 23, further wherein additional patient parameters comprise at least one of the group consisting of preferences for distance or near sight, preferences for sight under bright or dim conditions, and preferences for contrast sensitivity.

25. The method of claim 16, wherein the optical shape is further determined based on an expansion selected from the group consisting of a regular polynomial (EPTP or non-EPTP), a Zernike polynomial, a Fourier series, and a discrete shape entirety.

26. The method of claim 16, wherein the optical shape is further determined based on a presbyopia-add to pupil ratio (PAR), the PAR ranging from about 0.2 to about 1.0.

27. The method of claim 25, wherein the expansion is a 3rd order or 4th order non-EPTP expansion.

28. The method of claim 25, wherein the expansion is a 6th order or 8th order EPTP expansion.

29. The method of claim 16, wherein the optical shape has an optimizer value of about 5.0 or smaller.

30. A method for establishing a prescription that mitigates or treats presbyopia of an eye in a particular patient, the method comprising:

(a) inputting a set of patient parameters specific for the particular patient into an optimizer; and

(b) deriving a prescription for the particular patient with the optimizer per a goal function, the goal function related to a plurality of viewing conditions, so as to mitigate or treat the presbyopia in the patient.

31. The method of claim 30, further comprising inputting a radially symmetric initial optical shape.

32. The method of claim 31, wherein the radially symmetric shape is decomposed into a set of polynomials having at least two independent variables.

33. The method of claim 32, wherein one of the at least two independent variables is the ratio of a customized prescription shape diameter to pupil diameter.

34. The method of claim 30, wherein the goal function comprises a ratio of an optical parameter of the eye with a diffraction theory parameter.

35. The method of claim 30, wherein the iterative optimizer is configured to employ a method selected from the group consisting of Downhill Simplex method, Direction set method, and Simulated Annealing method.

36. A method for treating or mitigating presbyopia in a particular patient, the method comprising:

(a) selecting a goal function appropriate for presbyopia of an eye;

(b) inputting a set of patient parameters specific for the particular patient;

(c) determining an optical shape for the particular patient based on the set of patient parameters per the goal function; and

(d) mitigating or treating the presbyopia in the patient by administering to the patient a procedure selected from the group consisting of:

(i) ablating a corneal surface of the patient to provide a corneal shape that corresponds to the optical shape,

(ii) providing the patient with a contact lens or spectacle lens that has a shape that corresponds to the optical shape, and

(iii) providing the patient with an intra-ocular lens that has a shape that corresponds to the optical shape.

37. A system for establishing a prescription that mitigates or treats presbyopia in a particular patient, the system comprising:

(a) an input that accepts a set of patient parameters; and

(b) an optimizer module that determines the prescription for the particular patient based on the set of patient parameters, using a goal function appropriate for presbyopia of an eye.

38. The system of claim 37, wherein the goal function reflects optical quality throughout a vergence range.

39. The system of claim 37, wherein the goal function comprises a ratio of an optical parameter of the eye with a diffraction theory parameter.

40. The system of claim 39, wherein the goal function comprises at least one parameter selected from the group consisting of Strehl Ratio (CS), modulation transfer function (MTF), point spread function (PSF), encircled energy (EE), MTF volume or volume under MTF surface (MTFV), compound modulation transfer function (CMTF), and contrast sensitivity (CS).

41. The system of claim 37, wherein the goal function is based on geometrical optics.

42. The system of claim 41, wherein the goal function is determined using ray tracing.

43. The system of claim 37, wherein the set of patient parameters comprises at least one parameter selected from the group consisting of pupil size, residual accommodation, and power need.

44. The system of claim 37, wherein the module makes use of an initial optical shape, a set of initial conditions, and the set of patient parameters for an iterative optimization so as to establish an optical shape for the particular patient, using a goal function appropriate for presbyopia of an eye.

45. The system of claim 44, wherein the initial optical shape is radially symmetric.

46. The system of claim 45, wherein the radially symmetric shape is decomposed by the module into a set of polynomials having at least two independent variables.

47. The system of claim 46, wherein one of the at least two independent variables is the ratio of the customized shape diameter to pupil diameter.

48. The system of claim 44, wherein the goal function comprises a ratio of an optical parameter of the eye with a diffraction theory parameter.

49. The system of claim 44, wherein the optimizer is configured to employ a method selected from the group consisting of Downhill Simplex optimization, Direction set optimization, and Simulated Annealing optimization.

50. The system of claim 44, wherein the set of patient parameters comprises at least one parameter selected from the group consisting of pupil size, residual accommodation, and desired power.

51. A system for reprofiling a surface of a cornea of an eye of a particular patient from a first shape to a second shape having correctively improved optical properties, the system comprising:

(a) an input that accepts a set of patient parameters;

(b) a module that determines an optical shape for the particular patient based on the set of patient parameters, using a goal function appropriate for presbyopia of an eye;

(c) a processor that generates an ablation profile; and

(d) a laser system that directs laser energy onto the cornea according to the ablation profile so as to reprofile a surface of the cornea from the first shape to the second shape, the second shape corresponding to the determined optical shape.

52. A method for defining a prescription for treating presbyopia in a particular patient, the method comprising:

(a) providing an optical shape configured to treat the vision condition;

(b) determining a pupil diameter of the particular patient; and

(c) defining a prescription shape comprising a central portion, the central portion having a dimension within a range between about 0.35 and about 0.55 of the pupil diameter, the prescription shape based on:

(i) the pupil diameter;

(ii) an inner region of the optical shape; and

(iii) an attribute of at least one eye previously treated with the optical shape.

53. The method of claim 52, wherein the pupil diameter of the particular patient comprises a diameter based on at least one member selected from the group consisting of:

(a) a pupil diameter as measured when focusing on a near object;

(b) a pupil diameter as measured when focusing on a distant object;

(c) a pupil diameter as measured under photopic conditions;

(d) a pupil diameter as measured under mesopic conditions; and

(e) a pupil diameter as measured under scotopic conditions.

54. The method of claim 52, wherein the prescription shape is aspherical, and the central portion of the prescription shape is aspherical; the prescription shape is spherical and the central portion of the prescription shape is spherical; the prescription shape is aspherical, and the central portion of the prescription shape is spherical; or the prescription shape is spherical, and the central portion of the prescription shape is aspherical.

55. The method of claim 52, wherein the dimension of the prescription shape central portion comprises a diameter of the central portion and remains within a range between about 0.4 and about 0.5 of the pupil diameter of the particular patient.

56. The method of claim 52, wherein the dimension of the central portion comprises a diameter of the central portion and remains within a range between about 0.43 and about 0.46 of the pupil diameter of the particular patient.

57. The method of claim 52, wherein a power of the central portion is between about 1.5 diopters and about 4.0 diopters.

58. The method of claim 52, wherein a power of the central portion is about 3.1 diopters.

59. The method of claim 52, further comprising:

(d) treating the particular patient's eye with the defined prescription shape such that the presbyopia of the patient is ameliorated.

60. The method of claim 59, wherein the prescription shape is defined such that following treatment an acuity measurement of the particular patient's eye is optimized.

61. The method of claim 59, wherein the treating comprises administering to the particular patient a procedure selected from the group consisting of:

(a) ablating a corneal surface of the patient to provide a corneal surface shape having a dimension that corresponds to a dimension of the defined prescription shape,

(b) providing the patient with a contact lens having a dimension that corresponds to a dimension of the defined prescription shape, and

(c) providing the patient with an intra-ocular lens having a dimension that corresponds to a dimension of the defined refractive shape.

62. The method of claim 59, wherein the defined refractive shape includes an aspheric portion.

63. A system for scaling a prescription shape that treats a vision condition in a particular patient, the system comprising:

(a) an input that accepts a prescriptive shape specific for treating the vision condition;

(b) an input that accepts a pupil dimension of the particular patient; and

(c) a module that scales a central portion of the prescription shape based on the pupil dimension of the particular patient and an attribute of at least one eye previously treated with the prescriptive shape such that the prescription shape ameliorates an indication of the vision condition of the particular patient, and such that the central portion has dimension between about 0.35 and about 0.55 of the pupil diameter.

64. The system of claim 63, further comprising:

(d) a processor that generates an ablation profile; and

(e) a laser system that directs laser energy onto the cornea according to the ablation profile so as to reprofile a surface of the cornea according to the prescription shape.

65. A method for treating presbyopia of an eye of a patient, the method comprising:

identifying a first pupil size of the eye under a first viewing condition;

identifying a second pupil size of the eye under a second viewing condition;

calculating a presbyopia-mitigating prescription for the eye in response to the pupil sizes so that the eye has a first power suitable for the first viewing condition at the first size and so that the eye has a second power suitable for the second viewing condition at the second size.

66. The method of claim 65, wherein calculating the prescription comprises calculating a power map of the eye.

67. The method of claim 65, wherein calculating the prescription comprises calculating a first effective power of the eye with the first pupil size and calculating a second effective power of the eye with the second pupil size.

68. The method of claim 65, wherein the first and second pupil diameters are measured from the eye of the patient while the eye is viewing with the first and second viewing conditions, respectively.

69. The method of claim 65, wherein the prescription comprises a prescription shape, and further comprising altering the refraction of the eye with the prescription shape.

70. The method of claim 69, wherein the refraction of the eye is altered using at least one of a laser, a contact lens, an intraocular lens, and a spectacle.

71. The method of claim 65, further comprising identifying a third pupil diameter of the eye under a third viewing condition, wherein the prescription is calculated so that the eye has a third power suitable for the third viewing condition at the third diameter.

72 . The method of claim 65, further comprising identifying a plurality of additional pupil diameters of the eye under an associated plurality of additional viewing conditions, wherein the prescription is calculated so that the eye has, for each additional viewing condition, an associated suitable power at an associated additional diameter.

73. The method of claim 65, wherein calculating the prescription comprises determining at least one coefficient of a set of Zernike polynomials.

74. The method of claim 73, wherein calculating the prescription comprises determining a plurality of selected Zernike coefficients of spherical aberration at various orders.

75. The method of claim 65, wherein the eye at the first viewing condition is viewing at a first viewing distance, and wherein the eye at the second viewing condition is viewing at a second viewing distance which is less than the first distance, and wherein the first power is more negative than the second power.

76. The method of claim 75, wherein the eye at the first viewing condition has a power between 0.25D and -0.25D, and wherein the eye at the second viewing condition has a power between -0.5D and -3.0D.

77. A method for deriving a prescription for an eye, the method comprising:

determining a polynomial expansion from a wavefront of an eye;

calculating a plurality of effective powers based on a plurality of expansion coefficients of the polynomial expansion at different viewing pupil sizes; and

generating the prescription so as to provide a plurality of desired effective powers at said pupil sizes.

78. A method for determining an effective power of an eye under a viewing condition, the method comprising;

determining a plurality of coefficients of a Zernike polynomial expansion from a wavefront of an eye while the eye has a first pupil size;

determining a second pupil size of the pupil under the viewing condition;

calculating the effective power of the eye from at least one of the coefficients of the Zernike polynomial from a relationship between effective power and pupil size.

79. A system for correcting refraction of an eye, the system comprising:

at least one input for a first pupil size of the eye under a first viewing condition and a second pupil size of the eye under a second viewing condition;

a prescription calculating module, the module calculating a presbyopia-mitigating prescription for the eye in response to the pupil sizes so that the eye has a first power suitable for the first viewing condition at the first size and so that the eye has a second power suitable for the second viewing condition at the second size.

80. A system for deriving a prescription for an eye, the system comprising:

a polynomial expansion module having an input for a wavefront of an eye and an output for a polynomial expansion;

an effective power module having an input coupled to the output of the polynomial expansion module and an output, the effective power module determining an effective power from the polynomial expansion; and

a prescription module coupled to the effective power module, the prescription module generating the prescription so as to provide a plurality of different desired effective powers at an associated plurality of different viewing pupil sizes.

81. A system for determining an effective power of an eye under a viewing condition, the system comprising;

a first input for a plurality of coefficients of a Zernike polynomial expansion from a wavefront of an eye while the eye has a first pupil size;

a second input for a second pupil size of the pupil under the viewing condition;

an effective power calculating module for calculating the effective power of the eye from at least one of the coefficients of the Zernike polynomial and a relationship between effective power and pupil size.